SERVICE MANUAL

SP-50

4822 725 50889

marantz®

model SP-50

Surround Processor

MARANTZ DESIGN AND SERVICE

Using superior design and selected high grade components, MARANTZ company has created the ultimate in stereo sound.
Only **original MARANTZ parts** can insure that your MARANTZ product will continue to perform to the specifications for which it is famous.

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Telefax: +31/40.75.82.99
Telex: 35000 PHTC NL routing IND NLMTFAT

ORDERING PARTS:

Parts can be ordered either by mail or by telex. In both cases, correct part number has to be specified.
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1. Complete address
2. Complete part numbers and quantities required
3. Description of parts
4. Model number for which part is required
5. Way of shipment
6. Signature: any order form or telex must be signed otherwise such part order will be considered as null and void.

PARTS ORDERING

Parts may be ordered at the following addresses:

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Telex: 132.332

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Telex: 24466

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SERVICE A/S
Prags Boulevard 80
Postbox 1919
DK-2300 København S
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0680 Oslo 6
Norway
Telex: 72640

GREAT BRITAIN
MARANTZ AUDIO U.K. Ltd
Unit 15/16
Saxon Way Industrial Estate
Moor Lane
Harmondsworth UB7 OLW
Great Britain
Telex: 935196

GREECE
SHERTON ELECTRONICS S.A.
P.O.Box 21025
Hippocratus Street 188
Athens 11471
Greece
Telex: 216.795

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MARANTZ JAPAN, Inc.
35-1, 7-chome, Sagamiono
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Ussama Building
Fahd al Saleem Street
P.O.Box 23781
Safat-Kuwait
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AL ALAMIAH ELECTRONICS
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Riyadh 11432
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Main Road Martindale
P.O. Box. 58088
Newville 21114
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Ignacio Iglesias 10
Badalona (Barcelona)
Spain
Telex: 59355

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Försäljning AB
Tegeluddsvägen 1
S-115 84 Stockholm
Sweden
Telex: 14060

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DYNAVOX ELECTRONICS
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1701 Fribourg
Switzerland
Telex: 942377

TURKEY
DOGRUOL Ltd.
I.M.C.
6 Blok N°6310
Unkapani
Istanbul
Turkey
Telex: 22085

MALTA
CACHIA & GALEA
Republic Street, 68D
Valetta
Telex: 1682

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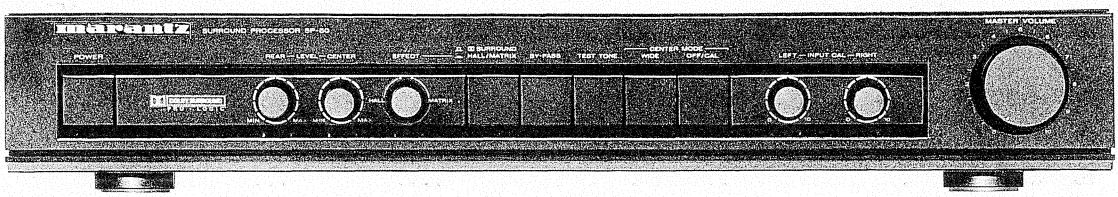
Outurela-carnaxide
2795 LinDA-A-VELHA
Telex: 43906

All of the above locations are fully equipped to take care of your total service needs. Because various countries have differing configuration requirements, it is necessary that you contact the service facility in your particular country. In the event that there is no service location listed for your country, please, contact the nearest facility for the necessary assistance.

In case of difficulties, do not hesitate to contact the Technical Department at abovementioned address.

MODEL SP-50 SURROUND PROCESSOR



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TECHNICAL SPECIFICATIONS (DIN)

Power output ..... 22 W, 4Ω
THD at half rated outputs 0.03%
Input sensitivity/Input impedance ..... 150 mV/50 kΩ
Output voltage/impedance (250 mV 1 kHz Input)
- Line output ..... 220 mV
- Front output ..... 1 V/3.3 kΩ
- Surround output ..... 1 V/3.3 kΩ
- Center output ..... 1 V/3.3 kΩ

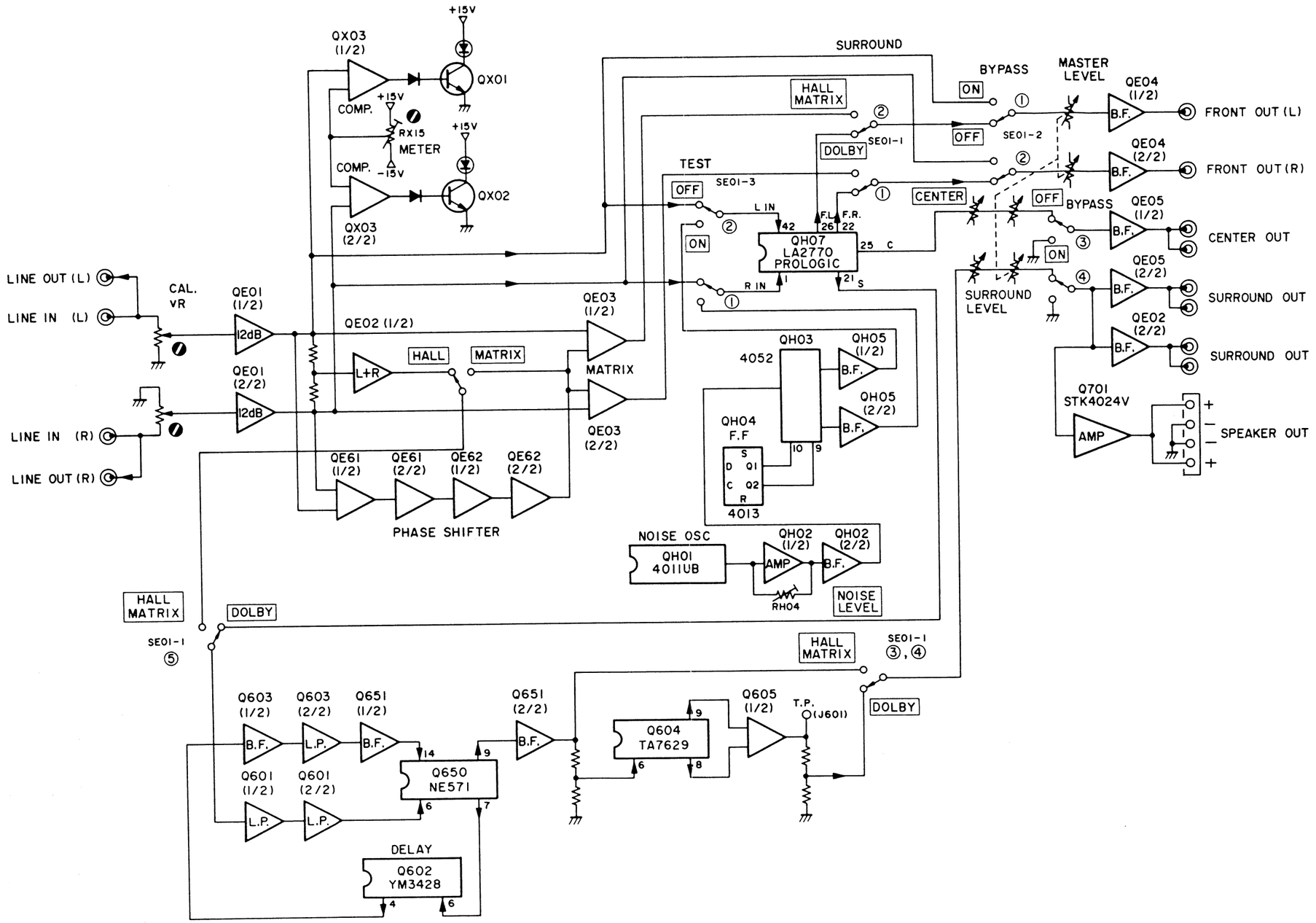
Frequency response
- Front output ..... 40 Hz–30 kHz (−3 dB)
- Surround output ..... 60 Hz–6 kHz (−3 dB)
- Center output ..... 60 Hz–30 kHz (−3 dB)

Delay time
- Digital delay ..... 20 m sec.

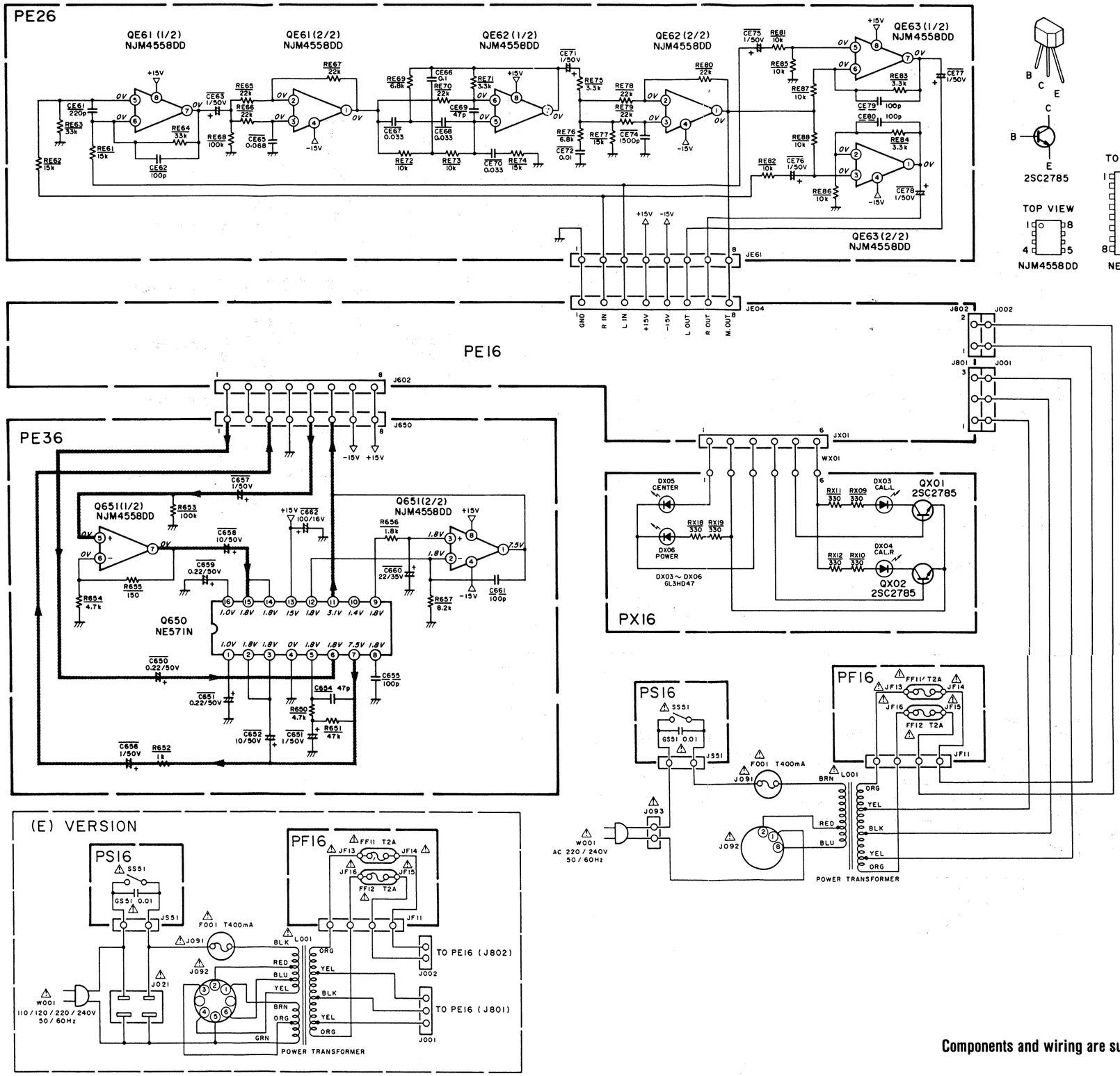
Signal/noise ratio

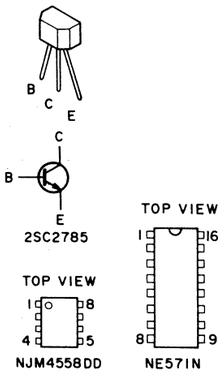
Dolby surround
- Front channel ..... −80 dB
- Center channel ..... 80 dB
- Surround channel ..... 96 dB

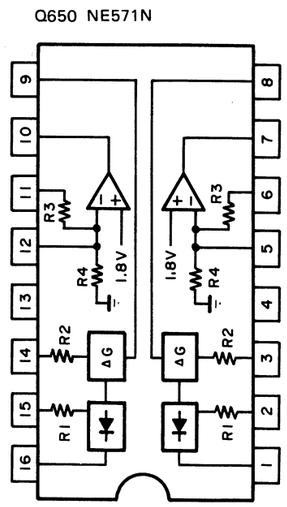
1. BLOCK DIAGRAM



2. SCHEMATIC DIAGRAM AND PARTS LOCATIONS (Pattern Side)

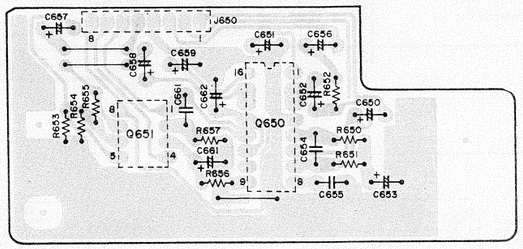




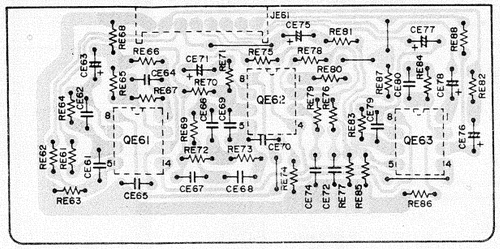


Components and wiring are subject to change for modification without notice.

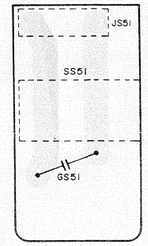
PE36



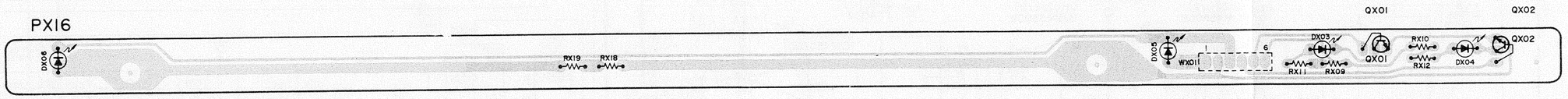
PE26



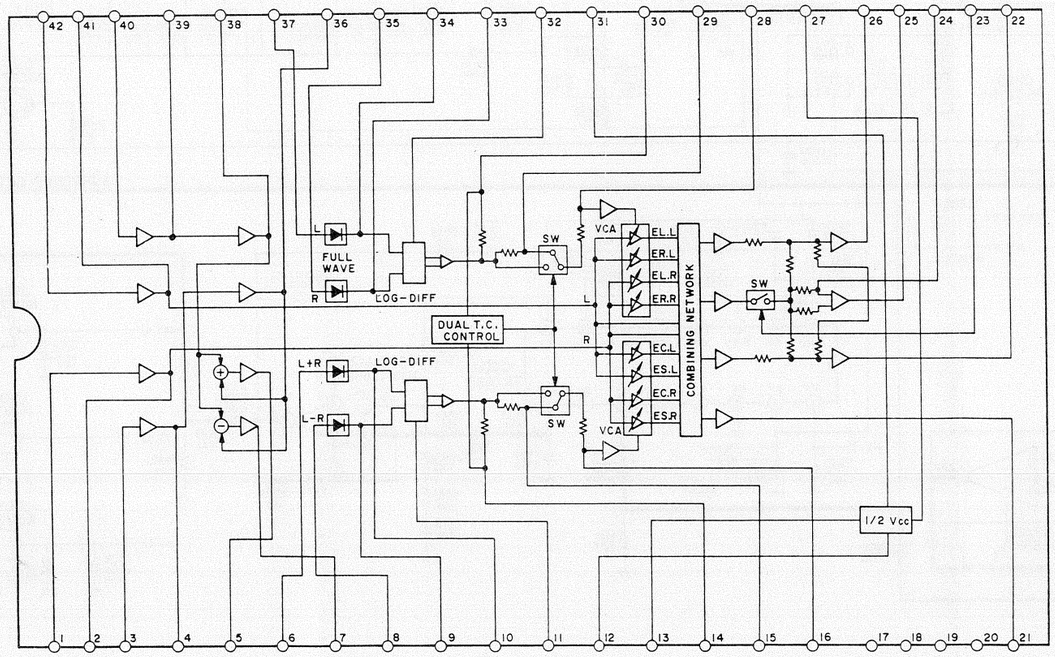
PS16



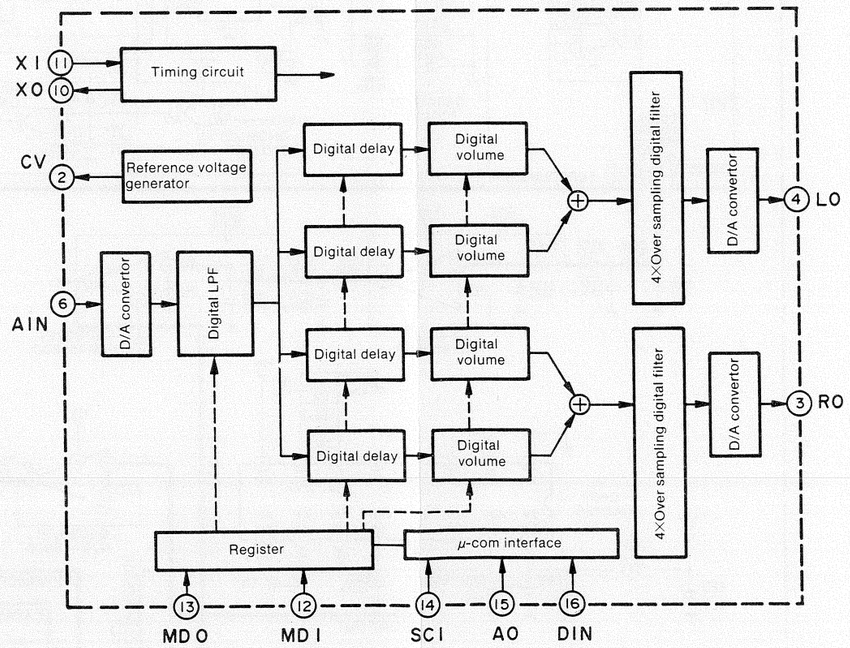
PX16



QH07 LA2770



Q602 YM3428



PE16

To PX16 (WX01)

To PE26 (JE61)

JX01

JE04

JE02(1/2)

LINE OUT-2

JE01

LINE OUT-1

LINE IN

JG01

CG01 0.01

QX03(1/2) NJM4558DD

QX03(2/2) NJM4558DD

METER

QE01(1/2) NJM4558DD

QE01(2/2) NJM4558DD

QE02(1/2) NJM4558DD

LINE IN(L)

LINE IN(R)

SURROUND MODE SE02

HALL

MATRIX

WE01

DOLBY SURROUND SE01-1

HALL MTRX

QH10 2SC2785

QH11 2SC2785

QH12 2SC2785

QH13 2SC2785

QH14 2SC2785

QH15 2SC2785

QH16 2SC2785

QH17 2SC2785

NORMAL WIDE SE01-4

NORMAL PHANTOM SH01

CENTOR SE01-5

FRONT(R)

FRONT(L)

CENTER OUT

WH01

QH02(1/2) NJM4558DD

QH02(2/2) NJM4558DD

NOISE T.P. JH01

100mV r.m.s

QH01(1/4) TC4011UBP

QH01(2/4) TC4011UBP

QH01(3/4) TC4011UBP

QH01(4/4) TC4011UBP

NOISE LEVEL

QH03(1/2) TC4052

QH03(2/2) TC4052

QH04(1/2) TC4013

QH04(2/2) TC4013

QH05(1/2) NJM4558DD

QH05(2/2) NJM4558DD

QH08(1/2) TC4030BP

QH08(2/2) TC4030BP

QH09 2SC2785

TEST SE01-3

ON

OFF

L C R S L

1.5sec

TEST ON 3V

OFF 0V

MUTE SIG.

QH07 LA2770

QH18 2SC2785

DOLBY SURROUND SE01-1

SURROUND

DOLBY

SURROUND OUT

Q601(1/2) NJM4558DD

Q601(2/2) NJM4558DD

Q602 YM3428

X601 4.58MHz

COMPRESSOR IN

COMPRESSOR OUT

DELAY IN

DELAY OUT

EXPANDER IN

EXPANDER OUT

Q603(1/2) NJM4558DD

Q603(2/2) NJM4558DD

Q604 TA7629

DOLBY T.P. J601

Q605(1/2) NJM4558DD

Q801 NJM7815A

Q804 NJM78M05A

Q802 NJM79M15A

D802 S1VB20

D803 S56B8G

J602

To PE36 J650

From POWER

10

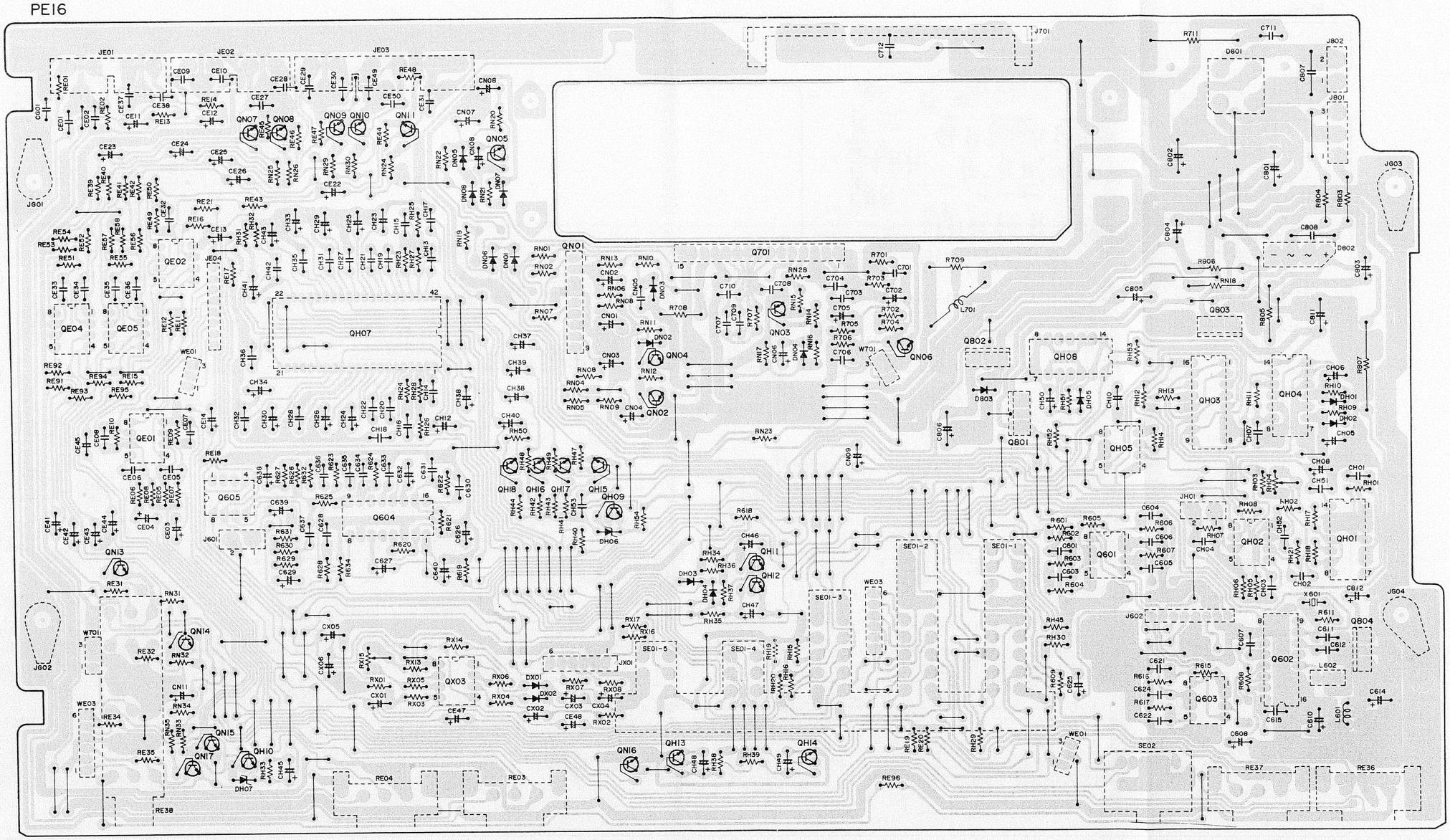
11

9

MZ 2280

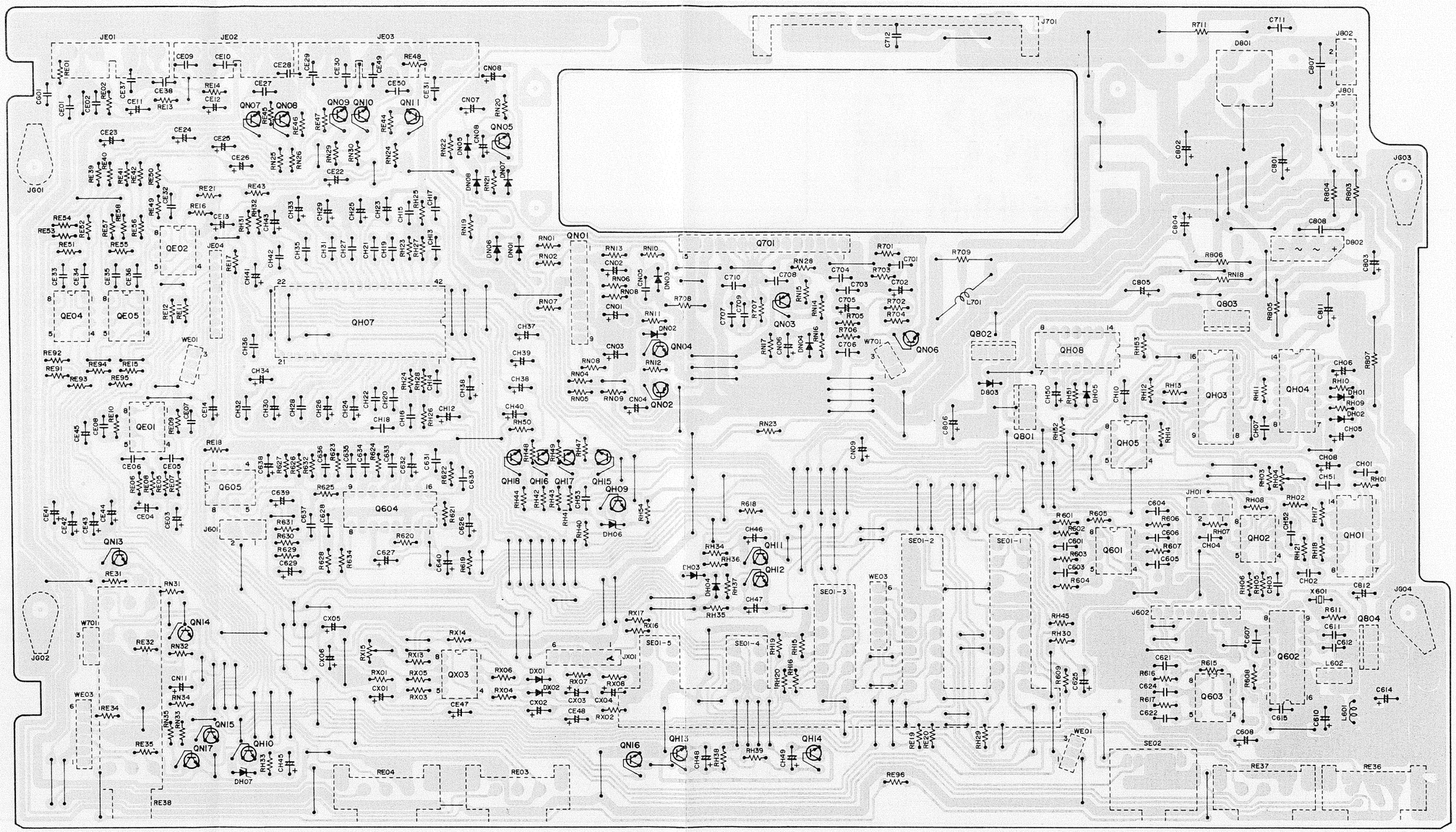
QE04 QE05 QE01 QE02 Q605 QN07~QN11 QH07 QN05 QN01 QN02 QN04 Q701 QN03 QN06 Q802 Q801 QH08 QH05 QH03 Q803 QH04
QN13 QN14 QN17 QN15 QH10 Q604 QX03 QH15~QH18 QH09 QN16 QH13 QH11 QH12 QH14 Q601 Q603 QH02 Q602 QH01 Q804

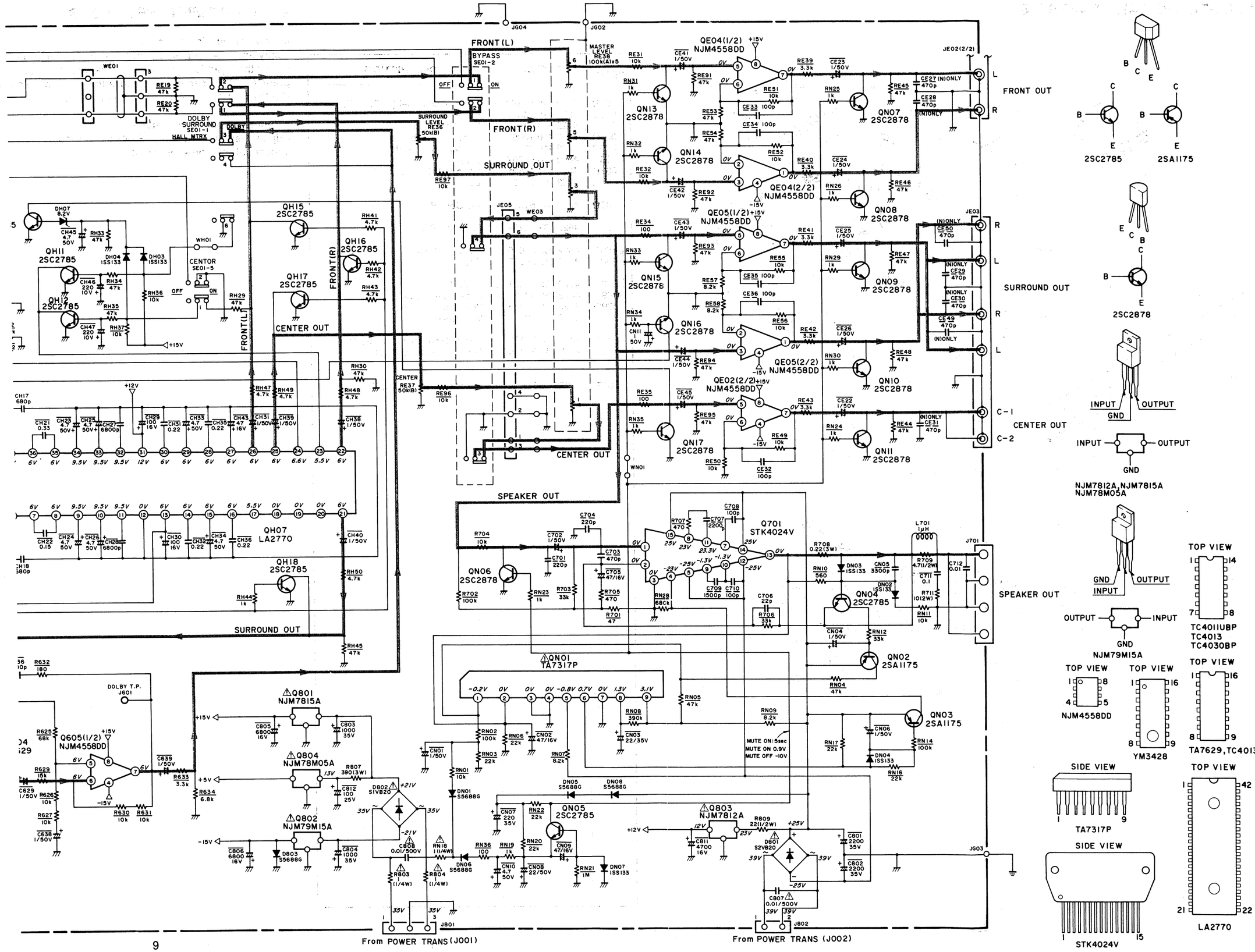
PE16



QE04 QE05 QE01 QE02 QE05 QN07~QN11 QH07 QN05 QN01 QN02 QN04 Q701 QN03 QN06 Q802 Q801 QH08 QH05 QH03 Q803 QH04
QN13 QN14 QN17 QN15 QH10 Q604 QX03 QH15~QH18 QH09 QN16 QH13 QH11 QH12 QH14 Q601 Q603 QH02 Q602 QH01 Q804

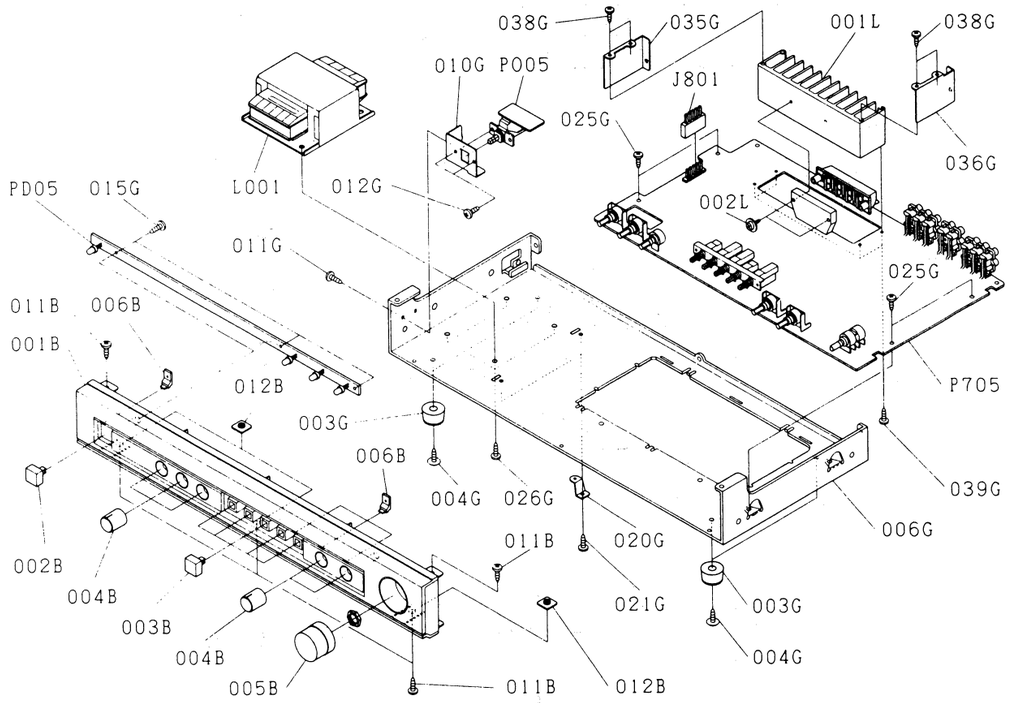
PE16

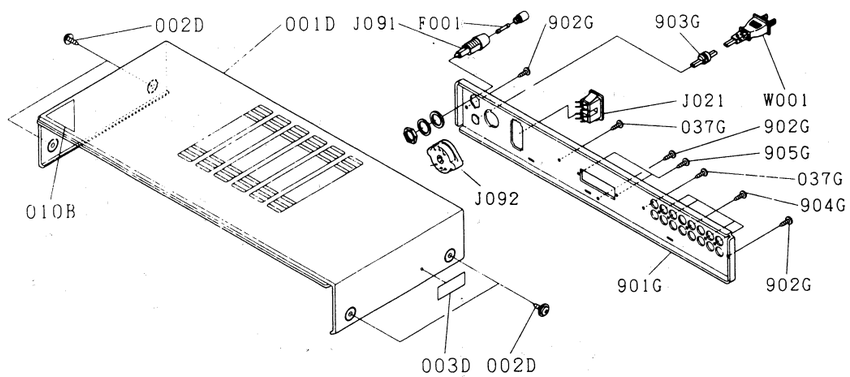



FRONT (L)
FRONT (R)
SURROUND OUT
CENTER OUT
SPEAKER OUT
FRONT OUT
SURROUND OUT
CENTER OUT
SPEAKER OUT
From POWER TRANS (J001)
From POWER TRANS (J002)
QE04(1/2) NJM4558DD
QE04(2/2) NJM4558DD
QE05(1/2) NJM4558DD
QE05(2/2) NJM4558DD
QE02(2/2) NJM4558DD
QN13 2SC2878
QN14 2SC2878
QN15 2SC2878
QN16 2SC2878
QN17 2SC2878
QN07 2SC2878
QN08 2SC2878
QN09 2SC2878
QN10 2SC2878
QN11 2SC2878
QH11 2SC2785
QH12 2SC2785
QH15 2SC2785
QH16 2SC2785
QH17 2SC2785
QH18 2SC2785
QH07 LA2770
QN06 2SC2878
Q701 STK4024V
QN04 2SC2785
QN02 2SA1175
QN03 2SA1175
QN01 TA7317P
Q801 NJM7815A
Q804 NJM78M05A
Q802 NJM79M15A
Q803 NJM7812A
Q605(1/2) NJM4558DD
QN05 2SC2785
DOLBY SURROUND SE01-1
HALL MTRX
CENTOR SE01-5
MASTER LEVEL RE38 100k(A)x5
BYPASS SE01-2
SURROUND LEVEL RE36 50k(B)
CENTER RE37 50k(B)
MUTE ON: 5sec
MUTE ON 0.9V
MUTE OFF -10V
2SC2785
2SA1175
2SC2878
NJM7812A, NJM7815A
NJM78M05A
NJM79M15A
NJM4558DD
YM3428
TA7317P
STK4024V
TC4011UBP
TC4013
TC4030BP
TA7629, TC4013
LA2770

MZ 2283

3. EXPLODED VIEW AND PARTS LIST





REF. DESIG.	PART NO.	DESCRIPTION
001B	4822 426 51387	Front Mold Panel [A, E, N, T]
002B	4822 410 24514	Power Button
003B	4822 410 24514	Function Button
004B	4822 410 10097	Function Knob
005B	4822 410 20135	Master Level Knob
006B	4822 410 60907	Lens
007B	4822 454 11825	Badge [A, E, N, T]
003G	4822 462 71361	Leg
903G	4822 532 51314	AC Cord Bush [U, E, F]
002L	4822 502 12499	Fin Neck B.T.
⚠F001	4822 253 30016	Fuse, 1.0A 250V [A, E, N, T]
⚠F002	4822 253 20017	Fuse, T800
⚠J021	4822 265 10091	Jack, AC Outlet
⚠J091	4822 256 30233	Jack, Fuse Holder
J092	4822 272 10236	Volt, Select. [A, N, T]
J092	4822 272 10227	Volt. Select. [E]
L001	4822 146 21473	Power Transformer [A, N, T]
L001	4822 146 21469	Power Transformer [E]
001T	4822 736 20444	User Manual [A, E, N, T]

4. ADJUSTMENT PROCEDURES

• Meter calibration adjustment

Apply an anti-phase signal of 1 kHz to the line input and adjust the input level so that 2 V appears at the Dolby test point (J601). At this time, also adjust a semi-fixed VR (RX15) so that the corresponding LED lights.

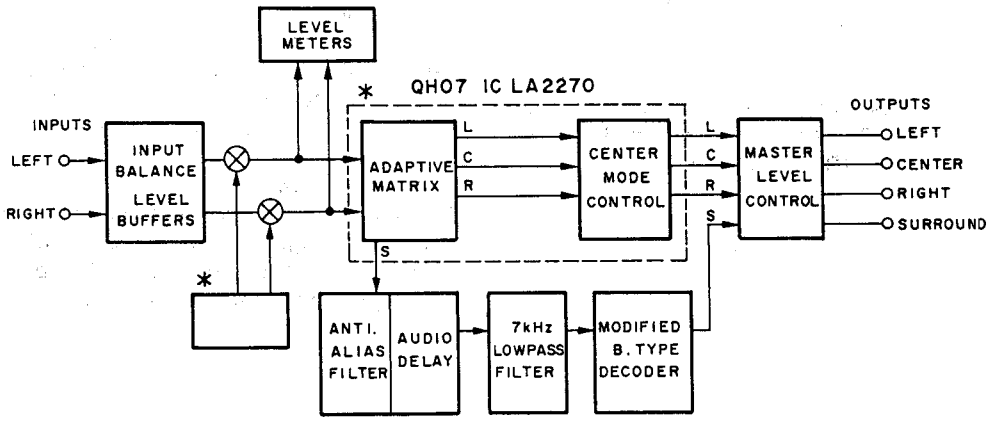
• Test tone noise level adjustment

Adjust a semi-fixed VR (RH0-4) so that 100 mV (RMS) appears at the noise test point (JH01).

5. TECHNICAL DESCRIPTION

5-1. Dolby Prologic

The Dolby Prologic contains an adaptive matrix (directional emphasis circuit) to actively extract the left, center, right and surround signals from sound tracks. This feature is called the active decoder from the fact that audio signals are continuously steered by instructions from the analog logic circuit which works to compensate for the separation of the four original input signals subject to partial loss in the matrix process. Figure 1 is the block diagram of the Dolby Prologic.



* The portion surrounded with broken lines is the point of difference from the conventional Dolby surround system.

Fig. 1 Active surround decoder block diagram

• Adaptive matrix (directional emphasis circuit)

— Refer to Figure 2 which is the block diagram of the directional emphasis circuit.

— The left and right signals entered to the matrix are separated between the following three purports.
① Analog control voltage generation
② Fixed signal components directly input to output synthesis circuit
③ VCA

— If with no bit of steering, the output is of usual stereo source. L=L, R=R, C=L+R, S=L−R

— In the matrix, steering is applied to the four main outputs through to addition or subtraction between left and right input signals extracted in different rates. As an example, when the input signal consists mainly of the center channel components, the signal is steered only to the center output.

The center channel components are contained in the left and right input signals equally. Therefore, without steering, emissions are to be made equally from the left, right and center outputs.
In this case, as regards the steering, using another left signal component, a VCA is gain controlled so that signals deny each other in the left channel output synthesis circuit, thereby eliminating unwanted output components. The other VCA performs the same process to the right signal.

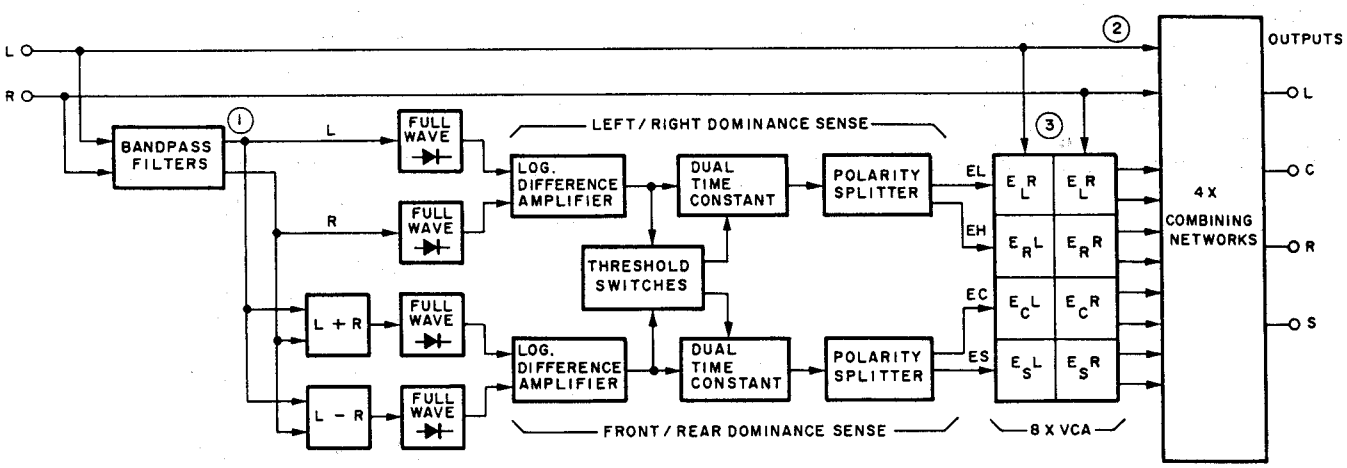


Fig. 2 Adaptive matrix block diagram

• Center channel mode control

Control is made by changing the time constant of pin 24 in IC QH07 (LA2770).

	QH13	QH14	
Normal mode	OFF	ON	CH42 (0.47 μF)
Wide mode	ON	ON	CH42/CH41 (10 μF)
Phantom mode	OFF	OFF	Open

Center components of phantom mode are separated between front L and R.

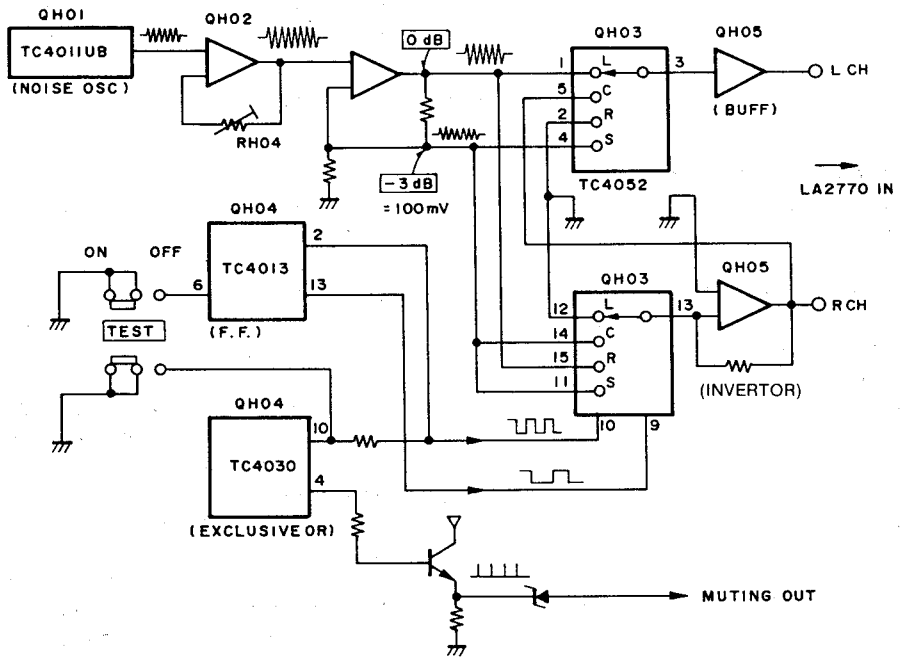
Note:
The NORMAL/WIDE switch on the front panel is not effective unless the NORMAL/PHANTOM switch on the rear panel is set at the "NORMAL" position.

Normal mode:
Suited to application where a small speaker or a TV's built-in speaker is used as the center speaker. From the center speaker, signals of more than 100 Hz are emitted. Signals of less than 100 Hz having almost no effect on the direction and localization are attenuated by 3 dB by the directional emphasis circuit, after that they are separated between the front left and right channels R equally.

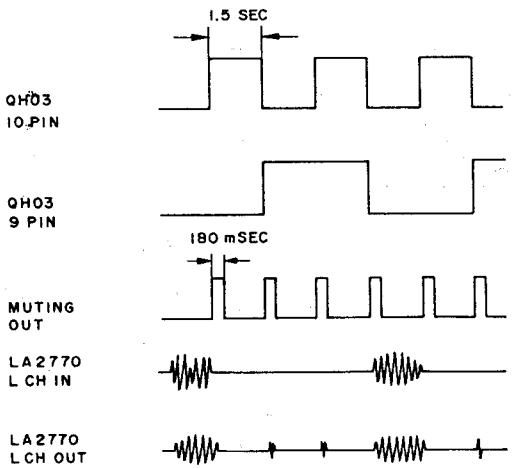
Wide mode:
Suited to application where a speaker well capable of sufficiently regenerating low-frequency sounds is used as the center speaker. A signal separated by the directional emphasis circuit is emitted as it is.

Phantom mode:
Suited to application where the center speaker is not used. The center signal is attenuated by 3 dB by the directional emphasis circuit, and signals of all bands are separated between the front left and right channels equally.

5-2. Test Tone



QH03 ⑩	QH03 ⑨	LA2770 Input Lch	LA2770 Input Rch	LA2770 Output
L	L	0 dB	OFF	L
H	L	−3 dB	−3 dB (in-phase)	C
L	H	OFF	0 dB	R
H	H	−3 dB	−3 dB (anti-phase)	S



6. ELECTRICAL PARTS LIST

ASSIGNMENT OF COMMON PARTS CODES.

RESISTOR

R***: (1) GD05---140, Carbon film fixed resistor, ±5%, 1/4W
R***: (2) GD05---160, Carbon film fixed resistor, ±5%, 1/6W
① — Resistance value

Examples
① Resistance value

0.1Ω...001	10Ω...100	1kΩ...102	100kΩ...104
0.5Ω...005	18Ω...180	2.7kΩ...272	680kΩ...684
1Ω...010	100Ω...101	10kΩ...103	1MΩ...105
6.8Ω...068	390Ω...391	22kΩ...223	4.7MΩ...475

(Note) Please distinguish 1/4W from 1/6W by the shape of parts used actually.

C***: CERAMIC CAP.
(1) DD1---370, Ceramic condenser
①② Disc type
Temp. coeff. P350 ~ N1000, 50V
② — Capacity value
① — Tolerance

Examples
① Tolerance (Capacity deviation)
±0.25pF...0
±0.5pF...1
±5%...5
* Tolerance of COMMON PARTS handled here are as follows:
0.5pF ~ 5pF...±0.25pF
6pF ~ 10pF...±0.5pF
12pF ~ 560pF...±5%
② Capacity value

0.5pF...005	3pF...030	100pF...101
1pF...010	10pF...100	220pF...221
1.5pF...015	47pF...470	560pF...561

C***: CERAMIC CAP.
(1) DK16---300, High dielectric constant ceramic condenser
① Disc type
Temp. chara. 2B4, 50V
① — Capacity value

Example
② Capacity value

100pF...101	1000pF...102	10000pF...103
470pF...471	2200pF...222	

C***: ELECTROLY CAP. (⫢), FILM CAP. (⫩)
(1) EA------10, Electrolytic condenser
①② One-way lead type, Tolerance ±20%
② — Dielectric strength
① — Capacity value

Examples
① Capacity value

0.1μF...104	4.7μF...475	100μF...107
0.33μF...334	10μF...106	330μF...337
1μF...105	22μF...226	1100μF...108
		2200μF...228

② Working voltage

6.3V...006	25V...025
10V...010	35V...035
16V...016	50V...050

(2) DF15---350, Plastic film condenser
① One-way type, Mylar ±5% 50V
① — Capacity value

Examples
① Capacity value

0.001μF (1000pF)...102	0.1μF...104
0.0018μF.....182	0.56μF...564
0.01μF.....103	1μF...105
0.015μF.....153	

REF. DESIG.	PART NO.	DESCRIPTION
		PE16-MAIN CIRCUIT BOARD
		PE16-CAPACITOR
CG01	4822 122 32486	Ceramic 0.01μF +80% −20%
CH17	4822 121 42713	Film 680pF ±5%
CH18	4822 121 42713	Film 680pF ±5%
CH51	4822 122 32486	Ceramic 0.01μF +80% −20%
CH54	4822 122 32917	Ceramic 33pF
CH55	4822 122 32917	Ceramic 33pF
C611	5322 122 32143	Ceramic 22pF ±5%
C612	5322 122 32143	Ceramic 22pF ±5%
C615	4822 122 40617	Ceramic 0.1μF +80% −20%
C628	4822 121 42327	Film 470pF ±5%
C706	5322 122 32143	Ceramic 22pF ±5%
C712	4822 122 32486	Ceramic 0.01μF +80% −20%
⚠C807	4822 122 40545	Ceramic 0.01μF ±10%
* C808	4822 122 40545	Ceramic 0.01μF ±10%
		PE16-RESISTOR
RE03	4822 116 60482	100KΩ(B), Variable
RE04	3822 116 60482	100KΩ(B), Variable
RE36	4822 116 60483	50KΩ(B)x2, Variable
RE37	4822 116 60483	50KΩ(B), Variable
RE38	4822 101 30671	100KΩ(A)x6, Variable
RH04	4822 100 11471	100KΩ, Trimming
RH08	4822 116 80257	6.19KΩ ±10% 1/6W
RH13	4822 116 80251	100KΩ ±10% 1/6W
RH14	4822 116 80251	100KΩ ±10% 1/6W
RH23	4822 116 80959	7.5KΩ ±10% 1/6W
RH24	4822 116 80959	7.5KΩ ±10% 1/6W
RN18	4822 116 60307	1Ω ±5% ¼W
RX15	4822 100 11373	4.7KΩ, Trimming
R708	4822 113 80363	0.22Ω ±10% 3W
R709	4822 116 52858	4.7Ω ±5% ½W
R711	4822 111 90726	10Ω ±5% 2W
⚠R803	4822 116 60307	1Ω ±5% ¼W, Fusible
⚠R804	4822 116 60307	1Ω ±5% ¼W, Fusible
⚠R805	4822 116 60312	2.2Ω ±5% ½W, Fusible
⚠R806	4822 116 60312	2.2Ω ±5% ½W, Fusible
R807	4822 116 82093	390Ω ±5% 3W, Metal
⚠R809	4822 116 80653	22Ω ±5% ½W, Fusible
		PE16-SEMICONDUCTORS
DH01 ≀ DH05	4822 130 33305	Diode 1SS133, etc.
DH06	4822 130 80273	Zener RD8.2JB2, etc.
DH07	4822 130 80273	Zener RD8.2JB2, etc.
DN01	4822 130 80839	Diode S5688G
DN02	4822 130 33305	Diode 1SS133, etc.
DN03	4822 130 33305	Diode 1SS133, etc.
DN04	4822 130 33305	Diode 1SS133, etc.
DN05	4822 130 80839	Diode S5688G
DN06	4822 130 80839	Diode S5688G
DN07	4822 130 33305	Diode 1SS133, etc.
DN08	4822 130 80839	Diode S5688G
DX01	4822 130 33305	Diode 1SS133, etc.
DX02	4822 130 33305	Diode 1SS133, etc.
JH01	4822 265 10158	Plug, 2P

REF. DESIG.	PART NO.	DESCRIPTION	
⚠D801	4822 130 80907	Diode	S2VB20
⚠D802	4822 130 33072	Diode	S1VB20
D803	4822 130 80839	Diode	S5688G
QE01	4822 200 83631	IC	NJM4558DD
QE02	4822 209 83631	IC	NJM4558DD
QE04	4822 209 83631	IC	NJM4558DD
QE05	4822 209 83631	IC	NJM4558DD
QH01	4822 209 61676	IC	TC4011UBP
QH02	4822 209 83631	IC	NJM4558DD
QH03	4822 209 61677	IC	TC4052
QH04	4822 209 80618	IC	TC4013
QH05	4822 209 83631	IC	NJM4558D
QH07	4822 209 61675	IC	LA2770
QH08	4822 209 83837	IC	TC4030BP
QH09 ~ QH18	4322 130 42052	Transistor	2SC2785(F, E)
⚠QN01	4822 209 83312	IC	TA7317P
QN02	4822 130 42591	Transistor	2SA1175(F, E)
QN03	4822 130 42591	Transistor	2SA1175(F, E)
QN04	5322 130 42052	Transistor	2SC2785(F, E)
QN05	5322 130 42052	Transistor	2SC2785(F, E)
QN06 ~ QN11	4822 130 43818	Transistor	2SC2878(A)
QN13 ~ QN17	4822 130 43818	Transistor	2SC2878(A)
QX01	5322 130 42052	Transistor	2SC2785(F, E)
QX02	5322 130 42052	Transistor	2SC2785(F, E)
QX03	5822 209 83631	IC	NJM4558DD
Q601	4822 209 83631	IC	NJM4558DD
Q602	4822 209 61846	IC	YM3428
Q603	4822 209 83631	IC	NJM4558DD
Q604	4822 209 82826	IC	TA7629P
Q605	4822 209 83631	IC	NJM4558DD
Q701	4822 209 61308	IC	STK4024
⚠Q801	4822 209 61848	IC	NJM7815A
⚠Q802	4822 209 83828	IC	NJM79M15A
⚠Q803	4822 209 60826	IC	NJM7812A
⚠Q804	4822 209 61847	IC	NJM78M05A
		PE16-MISCELLANEOUS	
JE01	4822 267 31049	Terminal, 4P; RCA Jack	
JE02	4822 267 40493	Terminal, 4P; RCA Jack	
JE03	4822 267 40547	Terminal, 6P; RCA Jack	
J701	4822 267 30494	Terminal, 4P; Speaker	
L601	4822 157 53801	Choke Coil, 47μH	
L701	4822 157 51739	Coil, 1μH	
SE01	4822 276 12686	Push Switch	
SE02	4822 273 10196	Rotary Switch	
SH01	4822 277 21362	Slide Switch	
X601	4822 242 72972	Crystal, 3.579545MHz	

REF. DESIG.	PART NO.	DESCRIPTION	
		PE26-MATRIX AMP CIRCUIT BOARD	
QE61	4822 209 83631	IC	NJM4558DD
QE62	4822 209 83631	IC	NJM4558DD
QE63	4822 209 83631	IC	NJM4558DD
		PS16-POWER SWITCH CIRCUIT BOARD	
⚠GS51	4822 122 33276	Ceramic Cap. 0.01μF	250V
⚠SS51	4822 276 11392	Push Switch, Power	
		PX16-LED CIRCUIT BOARD	
DX03 ~ DX06	4822 130 81723	L.E.D.	GL3HD47
		PE36-COMPRESS CIRCUIT BOARD	
Q650	4822 209 70368	IC	NE571N
Q651	4822 209 83631	IC	NJM4558DD
		PF16-FUSE CIRCUIT BOARD	
FF11	4822 272 10236	Fuse, T2A [A, E, N, T]	
FF12	4822 253 30025	Fuse, T2A [A, E, N, T]	

NOTE ON SAFETY:
Symbol ⚠ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol ⚠. Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.